

# The identity of *Nucula perminima* Monterosato, 1875 and *Yoldia striolata* Brugnone, 1876 (Bivalvia: Protobranchia)

Rafael La Perna\*

\* Dipartimento di Geologia e Geofisica, Università di Bari, via Orabona 4, 70125 Bari, Italy, r.laperna@geo.uniba.it

## Abstract

Two enigmatic protobranchs, *Nucula perminima* Monterosato, 1875 and *Yoldia striolata* Brugnone, 1876, are revised basing on material from the Monterosato collection. *Nucula perminima*, described from off Sciacca, southwestern Sicily, is a paedomorphic nuculid of which *Nucula recondita* Gofas & Salas, 1996 is a junior synonym. *Yoldia striolata*, described as a Pleistocene fossil from Ficarazzi, Palermo, has a complex systematic history: its synonym list includes *Yoldia producta* Monterosato, 1880 and *Yoldiella seguenziae* Bonfitto & Sabelli, 1995. The new combination is *Yoldiella striolata* (Brugnone, 1876).

## Riassunto

È stata effettuata la revisione di due specie enigmatiche di protobranchi, *Nucula perminima* Monterosato, 1875 e *Yoldia striolata* Brugnone, 1876, sulla base di materiale presente nella collezione Monterosato. *Nucula perminima*, descritta dai fondi coralligeni al largo di Sciacca, è una specie pedomorfica e non uno stadio giovanile di nuculide come erroneamente ritenuto da Monterosato. *Nucula recondita* Gofas & Salas, 1996 ne è un sinonimo più giovane. È una specie criptica, capace di vivere anche in ambiente di grotta. *Yoldia striolata*, descritta per il Pleistocene di Ficarazzi presso Palermo, ha una storia sistematica complessa: la lista dei suoi sinonimi comprende *Yoldia producta* Monterosato, 1880 e *Yoldiella seguenziae* Bonfitto & Sabelli, 1995. La nuova combinazione applicata a questa specie è *Yoldiella striolata* (Brugnone, 1876). È una specie di acque profonde, presente in Mediterraneo e nel vicino Atlantico.

## Key words

Systematics, *Nucula*, *Yoldiella*, Monterosato, Brugnone, Mediterranean.

## Introduction

*Nucula perminima* Monterosato, 1875 and *Yoldia striolata* Brugnone, 1876 are two enigmatic protobranchs described in the early literature, the former from off Sciacca, southwestern Sicily, the latter as a Pleistocene fossil from Sicily. *Nucula perminima* remained totally forgotten in the malacological literature, but the recent description of a new species, possibly a synonym of *N. perminima*, led the identity of this species to be debated. The history of *Yoldia striolata* is a long sequence of synonymies and interpretations. In the present work, the identity of both species is discussed basing on material from the Monterosato collection (Museo Civico di Zoologia, Roma).

### *Nucula perminima* Monterosato, 1875

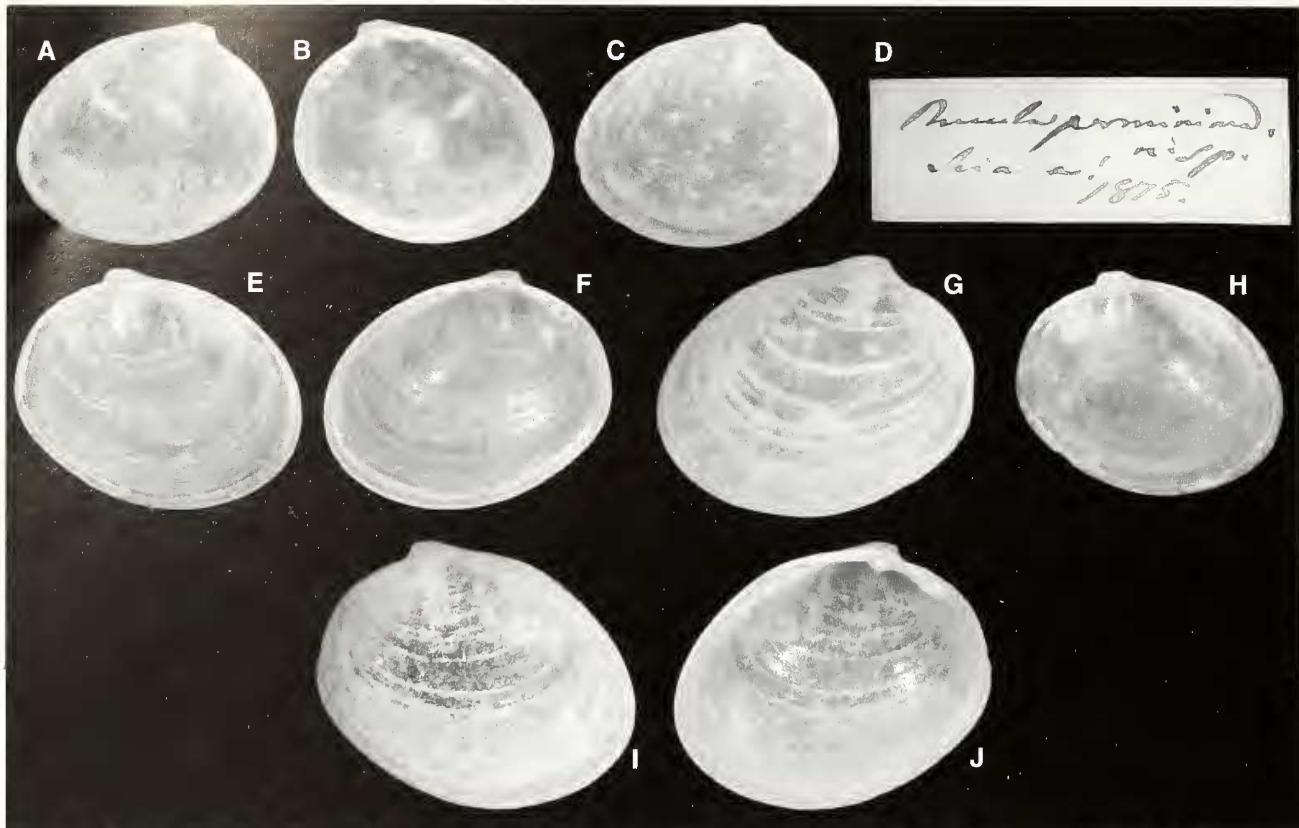
Monterosato (1875a) described *Nucula perminima* from the coralligenous bottoms off Sciacca, Sicily Channel. It was said to be very small ("La più piccola delle nostre *Nuculae* e forse anche di quante se ne conoscono viventi e fossili"), but apparently consisting of mature specimens. It was compared with young stages and growth series of other nuculids and found specifically distinct, even from *Nucula tenuis* (non *Nucula tenuis* Montagu, 1803, but *N. aegeensis* Forbes, 1844, now in *Ennucula* Iredale, 1931) which shares a smooth margin with *N. perminima*. A few years later, Monterosato (1878) listed some varieties of *Nucula nucleus* (L., 1758), including a var. *minima*

as a synonym of *N. perminima*. In the last note, Monterosato (1881) definitely regarded *N. perminima* as the juvenile stage of *N. aegeensis*.

The type material of *Nucula perminima* (MZR 14379, Fig. 1 D) consists of 12 valves and few complete shells (Fig. 1 A-C). This is a valid species, not a juvenile stage, clearly conspecific with the paedomorphic nuculid described from the Mediterranean as *Nucula recondita* by Gofas & Salas (1996: p. 430, figs. 14-22). The synonymy between *N. perminima* and *N. recondita* was first reported by Giannuzzi Savelli et al. (2001: p. 331, figs. 11-13) and Palazzi & Villari (2001: p. 24, figs. 91-96), but without the support of type material.

*Nucula perminima* actually is notably similar to the early stages of normal sized nuculid, as well documented by Gofas & Salas (1996) and this explains Monterosato's doubts about the taxonomic status. Up to the size of *N. perminima* (about 1 mm), all the juvenile nuculids have a smooth margin, but this species has well distinct, functional primary teeth whereas they are strongly reduced or totally lost in the other species (Gofas & Salas, 1996). The larval shell is flattish, with a central depression (Gofas & Salas, 1996).

This species exhibits a remarkable variability in the shell outline. The type material is less elongate and more convex ventrally than the specimens illustrated by Gofas & Salas (1996). Shell elongation and ventral convexity are also variable in the shells illustrated by Giannuzzi Savelli et al. (2001) and Palazzi & Villari (2001). The



**Fig. 1.** *Nucula perminima* Monterosato, 1875. **A-C.** Syntypes, Sicily Channel, off Sciacca (MZR 14379): **A, B.** 1.02 mm; **C.** 1.03 mm. **D.** Monterosato's label. **E-J.** Grotta dell'Accademia, Ustica Island, southern Tyrrhenian (author's collection): **E, F.** 1.13 mm; **G.** 1.24 mm; **H.** 1.05 mm; **I, J.** 1.23 mm.

**Fig. 1.** *Nucula perminima* Monterosato, 1875. **A-C.** Sintipi, Canale di Sicilia, al largo di Sciacca (MZR 14379): **A, B.** 1.02 mm; **C.** 1.03 mm. **D.** Etichetta di Monterosato. **E-J.** Grotta dell'Accademia, Isola di Ustica, Mar Tirreno meridionale (collezione dell'autore): **E, F.** 1.13 mm; **G.** 1.24 mm; **H.** 1.05 mm; **I, J.** 1.23 mm.

shells from a shallow water cave (Di Geronimo et al., 1997) have a slightly more oblique outline (Fig. 1 E-J). The life habits of *N. perminima* must be notably different from those of the normal sized nuculids, inhabiting soft bottoms as shallow burrowers. The original records of *N. perminima* and *N. recondita* are from hard substrates, the former from cavities and crevices in volcanic boulders colonized by *Corallum rubrum*, the latter from rocky bottoms with *Laminaria* and from *Posidonia* beds. Di Geronimo et al. (1997) reported this species from cave assemblages obtained from sediment samples. Also the record by Palazzi & Villari (2001) is from cave assemblages. *Nucula perminima* is evidently a cryptic species, as suggested by Di Geronimo et al. (1997: p. 24). Thanks to miniaturization, implying a lowering of energy requirement, it is able to cope with the oligotrophic conditions in the caves (Hayami & Kase, 1993). Similar considerations could be also applied to *Nucula bicornis*, another paedomorphic species from the Canary Islands, also described by Gofas & Salas (1996).

According to Hanken & Wake (1993), miniaturization may imply important phylogenetic perspectives. The suggestion by Gofas & Salas (1996) about the need for a new genus for these paedomorphic nuculids is herein strongly supported. Concerning this, other cases of miniaturized molluscs, such as the mytilid *Dacrydium* Torell, 1859 (Ockelmann, 1983; Salas & Gofas, 1997) and the nuculanid *Microgloma* Sanders & Allen, 1973 (Ockelmann & Warén, 1989), constitute systematic precedents.

#### *Yoldia striolata* Brugnone, 1876

Brugnone (1876: p. 9, fig. 9) described *Yoldia striolata* from Ficarazzi (Palermo), an Early Pleistocene (Sicilian) locality, frequently mentioned in the early literature on fossil molluscs (see Greco, 1986). The original illustration is poor, only showing the external surface of an ovate, moderately inequilateral bivalve with a weak commarginal sculpture and a relatively prominent umbo. No type material of *Y. striolata* was found in the Brugnone collection (Museo "G.G. Gemmellaro", University of Palermo) nor in the Monterosato collection. The history of this species starts with Monterosato (1875b), who introduced *Leda (Yoldia) producta* as a *nom nudum* for an extant species from off Palermo, quoting *Yoldia abyssicola* Torell, 1859 as a dubious synonym. It was then reported (Monterosato, 1877) from the Pleistocene of Ficarazzi, as a synonym of *Y. abyssicola* and *Y. striolata* and again as a synonym of *Y. abyssicola* in a checklist of living Mediterranean molluscs (Monterosato, 1878). Finally, Monterosato (1880) made available the name *Yoldia producta* by giving a reference to the published description of *Y. striolata* Brugnone, mentioning "type given by the author" and *Y. abyssicola* (non Torell) sensu Monterosato, 1878 as a misidentification of the same species. Therefore, *Yoldia producta* is an objective synonym of *Y. striolata*. It was said to be "different from *Y. lenticula*, Möll. (= *Y. abyssicola*, Torell), which is from Norway and all the Arctic region".

Seguenza (1877: p. 1180, pl. 5, fig. 28) reported *Yoldia abyssicola* Torell, 1859 from the Plio-Pleistocene of Southern Italy, with *Y. producta* and *Y. striolata* as synonyms. The illustration shows a bivalve somewhat similar to *Yoldiella philippiana* (Nyst, 1845), with a narrower posterior side and a commarginal striation. The same synonyms were listed for *Yoldia abyssicola* in a later work (Seguenza, 1879: p. 284).

Jeffreys (1879: p. 54) reported *Leda striolata* Brugnone from some deep water stations in the Northeast Atlantic, with *Yoldia abyssicola* sensu Seguenza and *Yoldia producta* Monterosato as synonyms. It was compared with *Leda lenticula* Möller, 1842 as follows: "flatter, more sharply pointed or wedge-shaped at the anterior [sic] end, and concentrically striated; the striae are regular and sometimes numerous, but usually distant and covering the front only". Jeffreys added: "I had provisionally named this species *acutalis*".

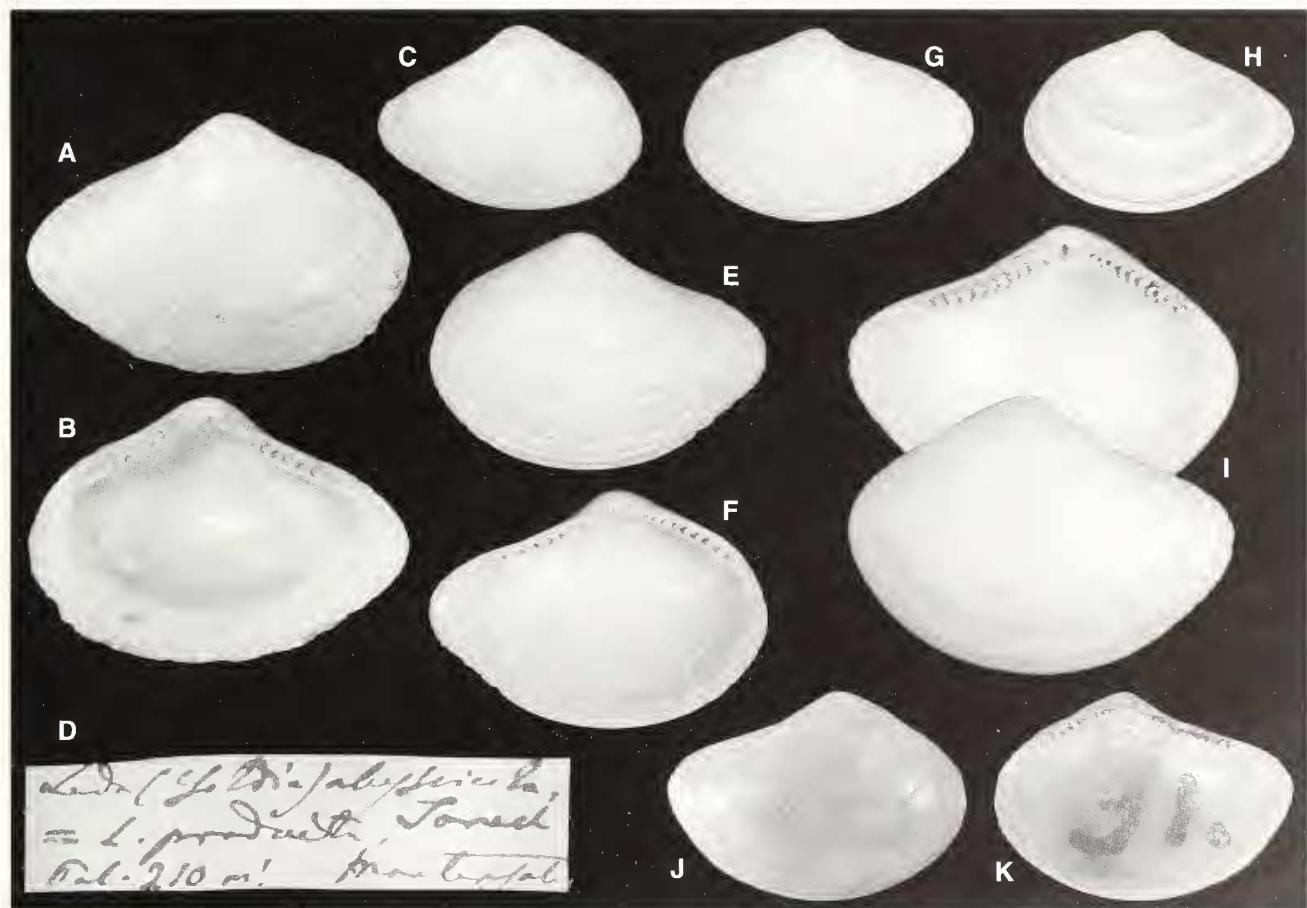
Warén (1989) gave an identity to *Yoldia striolata*, relying on material from the Jeffreys collection. For unknown reasons (mislabelling?), he found no difference between the material referred therein to *striolata* Brugnone and

to *pusio* Philippi, although these species were kept as distinct by Jeffreys (1879). Since *Leda pusio* sensu Jeffreys was mostly based on his var. *latior*, misidentified as var. *salicensis* Seguenza, 1877 (Jeffreys, 1876, 1879), Warén (1989) proposed the synonymy *striolata* = *latior* = *salicensis* and applied the combination *Neilonella striolata* (in family Neilonellidae Schileyko, 1989) to *Leda pusio* var. *latior* Jeffreys, 1876.

Allen & Sanders (1996), basing on the illustration of *Yoldia abyssicola* by Seguenza (1877), concluded that *producta* and *striolata* were the same species, without mentioning that they are objective synonyms, and different from *Leda pusio* var. *latior* to which they applied the combination *Neilonella salicensis*.

More recently, Jeffreys' var. *latior* was moved to the genus *Pseudoneilonella* Laghi, 1986 (Neilonellidae) as *P. latior* (Jeffreys, 1876) by La Perna (2007). In the same work, *Pseudoneilonella pusio* (Philippi, 1844) and *P. salicensis* (Seguenza, 1877) from the Mediterranean Plio-Pleistocene, were kept as distinct species.

Warén's (1989) interpretation of *Yoldia striolata* as *Leda pusio* var. *latior* Jeffreys was questioned by Di Geronimo



**Fig. 2. A-C, E-H.** *Yoldiella striolata* (Brugnone, 1876). **A, B.** Syntype of *Yoldia producta* Monterosato, 1880, Palermo, 210 m, 4.68 mm (MZR 14425). **C.** Marseille, 3.20 mm (MZR 14425). **D.** Monterosato's label [*Leda (Yoldia) abyssicola* Torell = *L. producta* Monterosato Pal. 210 m!]. **E-G.** Archi (southern Calabria), Early-Middle Pleistocene. **E, F.** 4.06 mm (author's collection); **G.** 3.51 mm (author's collection). **H.** Southern Tyrrhenian, Eocumm95 st. 14, 38°20'08" N, 14°10'47" E, 1139 m, 3.20 mm (author's collection). **I-K.** *Yoldiella philippiana* (Nyst, 1845): **I.** Villafranca Tirrena (Messina), Early Pleistocene, 5.20 mm (author's collection). **J, K.** Syntype of *Nucula tenuis* Philippi, 1844, 3.60 mm (Humboldt Museum, Berlin; photo A. Warén).

**Fig. 2. A-C, E-H.** *Yoldiella striolata* (Brugnone, 1876). **A, B.** Sintipo di *Yoldia producta* Monterosato, 1880, Palermo, 210 m, 4,68 mm (MZR 14425). **C.** Marsiglia, 3,20 mm (MZR 14425). **D.** Etichetta di Monterosato [*Leda (Yoldia) abyssicola* Torell = *L. producta* Monterosato Pal. 210 m!]. **E-G.** Archi (Calabria meridionale), Pleistocene inferiore-medio. **E, F.** 4,06 mm (collezione dell'autore); **G.** 3,51 mm (collezione dell'autore). **H.** Mar Tirreno meridionale, Eocumm95 st. 14, 38°20'08" N, 14°10'47" E, 1139 m, 3,20 mm (collezione dell'autore). **I-K.** *Yoldiella philippiana* (Nyst, 1845): **I.** Villafranca Tirrena (Messina), Pleistocene inferiore, 5,20 mm (collezione dell'autore). **J, K.** Sintipo di *Nucula tenuis* Philippi, 1844, 3,60 mm (Museo Humboldt, Berlino, foto A. Warén).

a	
<i>Testa minuta, ovata, subaequilatera</i>	+
Shell small, ovate, subaequilateral	+
<i>transversum tenuiter striata</i>	+
transversally finely striated	+
<i>striae in medio testae remotiores,</i>	
<i>in umbonibus obsolete</i>	
striae more distant in the middle of shell,	
lost on umbo	+
<i>lateribus rotundatis; postico subattenuato,</i>	
<i>vix altero productiore</i>	
both sides rounded; posteriorly narrower	
and slightly more elongate	+
<i>margine integro</i>	
margin smooth	+
b	
<i>Differt a Yoldia tenui (Nucula) Phil., cuius formam</i>	
<i>quadammodo simulat,</i>	
It differs from <i>Yoldia tenuis</i> , to which it is somewhat	
similar in shape,	
<i>testa majore</i>	
by a larger	
<i>ventricosiore</i>	
more convex shell	+
<i>umbonibus tuuidioribus et magis incurvis</i>	
umbo more inflated and curved	+
<i>angulo apicali acutiore</i>	
umbonal angle sharper	+
<i>latere postico retuso</i>	
posterior side obtuse	+
<i>externa superficie argute striata</i>	
outer surface distinctly striated	+

**Tab. 1.** Original description of *Yoldia striolata* Brugnone, 1876. Crosses indicate full correspondence with the characters of *Yoldiella seguenziae* Bonfitto & Sabelli, 1995 (a) and with the differences between *Y. seguenziae* and *Y. philippiana* (b).

**Tab. 1.** Descrizione originale di *Yoldia striolata* Brugnone, 1876. Le crocette indicano piena corrispondenza con i caratteri di *Yoldiella seguenziae* Bonfitto & Sabelli, 1995 (a) e con le differenze fra *Y. seguenziae* and *Y. philippiana* (b).

& La Perna (1997) and La Perna (2003), but without proposing an alternative interpretation. Brugnone described his species using the word *striata* and compared it with *Nucula tenuis* Philippi, 1844, i.e. *Yoldiella philippiana* (Nyst, 1845) (see Warén, 1989 for the nomenclatural history of *Nucula tenuis* Philippi, 1844). *Yoldia striolata* must be then a protobranch with a sculpture of commarginal striae, different from the coarser sculpture of *Pseudouciliella latior* and similar, in the gross shell morphology, to *Yoldiella philippiana*. On the other hand, Torell's *Yoldia abyssicola* is a junior synonym of *Yoldiella lenticula* (Möller, 1842), an Arctic species somewhat similar to *Y. philippiana* (Warén, 1989: p. 239, figs. 8c, d; 10e, f).

The proper understanding of Brugnone's species should be based on the concept which Monterosato (1880) had

of this species: he had the possibility to compare his Recent material of *producta* side by side with the fossil type of *striolata*, given by Brugnone (see above), and realized that they were the same species. The material of *Yoldia producta* (MCZ 14425, Fig. 2 D) consists of two valves and a few fragments from off Palermo (Fig. 2 A, B) and of a single, smaller valve from Marseille (Fig. 2 C). This material is conspecific with *Yoldiella seguenziae* Bonfitto & Sabelli, 1995, described from the Tyrrhenian Sea (Bonfitto & Sabelli, 1995). *Yoldiella striolata* (Brugnone, 1876) is then the new combination for *Yoldia striolata*.

There is a close match between the description of *Yoldia striolata* and the characters of *Yoldiella seguenziae* (Tab. 1 A). Also the differences remarked by Brugnone (1876) between *Yoldia striolata* and *Yoldia tenuis* (Philippi) correspond to the differences between *Yoldiella seguenziae* and *Y. philippiana* (Tab. 1 B). The only apparent discrepancy lays in size: *Y. striolata* was said to be larger than *Y. philippiana*, but the two species attain a similar maximum shell size, about 5 mm in length, according to the morphometric data by Bonfitto & Sabelli (1995). Brugnone's specimen was described as being 6 mm long, 4.5 mm high and 3 mm wide: it was then particularly large, but the length to height ratio is 1.33, close to 1.38 calculated for the largest valves (5.0 mm in length) of *Y. seguenziae* from the data of Bonfitto & Sabelli (1995).

The sculpture of *Yoldiella striolata* is somewhat variable, from a pattern of well defined commarginal striae, mainly near the ventral margin, to almost consisting of only growth lines, as seen in the present illustrations (Fig. 2 A-C, E-H) and in other illustrated material (Bonfitto & Sabelli, 1996: fig. 5, 6; Di Geronimo & La Perna, 1997: pl. 7, figs. 5, 6; Giannuzzi Savelli et al., 2001: figs. 58, 59). The same illustrations also cover the variability range in shell shape of this species. For comparison, material of *Yoldiella philippiana* is here illustrated (Figs. 2 I-K), including a syntype of *Nucula tenuis* Philippi, 1844.

*Yoldiella striolata* is a deep water species, also occurring in the adjacent Atlantic, with a depth range of 500-2000 m (Bonfitto & Sabelli, 1995; Salas, 1996; La Perna, 2003). The Ficarazzi stratigraphic sequence includes shallow water calcarenites and fine grained deposits of outer shelf-upper slope deposition (Buccheri, 1983, 1984). Some bathyal species were reported from this locality by Monterosato (1872).

## Acknowledgements

A special thank to Lionello Tringali (Rome), for his kind assistance at the Monterosato collection and to Anders Warén (Naturhistoriska riksmuseet, Stockholm), for help at various stages. Serge Gofas (Universidad de Málaga) and John Allen (University Marine Biological Station, Millport) are acknowledged for their careful review.

Work supported by Fondi di Ricerca d'Ateneo 2006 (resp. La Perna).

## References

- ALLEN J.A. & SANDERS H.L., 1996. Studies on the deep-sea Protobranchia (Bivalvia): the family Neilonellidae and the family Nuculanidae. *The Natural History Museum (London), Bulletin (Zoology)*; **62** (2): 101-132.
- BONFITTO A. & SABELLI B., 1995. *Yoldiella seguenziae*, a new species of the Nuculanidae (Bivalvia; Nuculoidea) from the Mediterranean Sea. *Journal of Molluscan Studies*; **61**: 21-27.
- BUCCHERI G., 1983. Osservazioni paleoclimatiche sul Siciliano della Sicilia occidentale. La sezione della località tipo di Ficarazzi (Palermo). *Rendiconti della Società Geologica Italiana*; **5**: 51-54.
- BUCCHERI G., 1983. Pteropods as climatic indicators in Quaternary sequences: a Lower-Middle Pleistocene sequence outcropping in Cava Puleo (Ficarazzi, Palermo, Italy). *Palaeogeography, Palaeoclimatology, Palaeoecology*; **45**: 75-86.
- BRUGNONE G., 1876. *Miscellanea malachologica. Pars secunda. Typographia Lao*, Palermo, 25 pp.
- DI GERONIMO I., ALLEGRI S., IMPROTA R., LA PERRA R., ROSSO A. & SANFILIPPO R., 1997. Spatial and temporal aspects of benthic thanatocoenoses in a Mediterranean infralittoral cave. *Rivista Italiana di Paleontologia e Stratigrafia*; **103**: 15-28.
- DI GERONIMO I. & LA PERRA R., 1997. Pleistocene bathyal molluscan assemblages from Southern Italy. *Rivista Italiana di Paleontologia e Stratigrafia*; **103**: 389-426.
- GIANNUZZI-SAVELLI R., PUSATERI P., PALMERI A., EBREO C., COPPINI M., MARGELLI A. & BOGI C., 2001. *Atlante delle conchiglie marine del Mediterraneo*. Evolver, Roma, 246 pp.
- GOFAS S. & SALAS C., 1996. Small nuculidae (Bivalvia) with functional primary hinge in the adults. *Journal of Conchology*; **35**: 427-435.
- GRECO A., 1986. Repertorio dei molluschi marini plio-pleistocenici della Sicilia. Parte II ed appendice. *Quaderni del Museo Geologico "G.G. Gemmellaro"*; **1**: 1-326.
- JEFFREYS, J.G. 1876. New and peculiar Mollusca of the *Pecten*, *Mytilus* and *Arca* families, procured in the Valorous Expedition. *Annual Magazine of Natural History*, s. 4; **18**: 424-436.
- JEFFREYS J.G., 1879. On the Mollusca procured during the Lightning and Porcupine Expeditions. Part 2. *Proceedings of the Zoological Society, London*; **1878**: 553-588.
- HANKEN J. & WAKE D.B., 1993. Miniaturization of body size: organismal consequences and evolutionary significance. *Annual Review of Ecology and Systematics*; **24**: 501-519.
- HAYAMI I. & KASE T., 1993. Submarine cave Bivalvia from the Ryukyu Islands: systematics and evolutionary significance. *The University Museum, The University of Tokyo, Bulletin*; **35**: 1-133.
- LA PERRA R., 2003. The Quaternary deep-sea protobranch fauna from the Mediterranean: composition, depth-related distribution and changes. *Bollettino Malacologico*; **39**: 17-34.
- LA PERRA R., 2007. Taxonomy of the family Neilonellidae (Bivalvia, Protobranchia): Miocene and Plio-Pleistocene species of *Pseudoneilonella* Laghi, 1986 from Italy. *The Veliger*; **49** (3): 196-208.
- MONTEROSATO T.M.A., 1872. *Notizie intorno alle conchiglie fossili di Monte Pellegrino e Ficarazzi*. Ufficio Tipografico Michele Amenta, Palermo, 44 pp.
- MONTEROSATO T.M.A., 1875a. *Poche note sulla conchiglogia mediterranea*. Tipografia del Giornale di Sicilia, Palermo, 15 pp.
- MONTEROSATO T.M.A., 1875b. Nuova rivista delle conchiglie mediterranee. *Atti dell'Accademia di Scienze, Lettere ed Arti, Palermo, sez. 2*; **5**: 1-50.
- MONTEROSATO T.M.A., 1877. Catalogo delle conchiglie fossili di Monte Pellegrino e Ficarazzi presso Palermo. *Bollettino del Reale Comitato Geologico d'Italia*; **1-2**: 28-42.
- MONTEROSATO T.M.A., 1878. Enumerazione e sinonimia delle conchiglie mediterranee. *Giornale di Scienze Naturali ed Economiche*; **13**: 61-115.
- MONTEROSATO T.M.A., 1880. Conchiglie della zona degli abissi. *Bullettino della Società Malacologica Italiana*; **6**: 50-82.
- MONTEROSATO T.M.A., 1881. Conchiglie del Mediterraneo. *Naturalista Siciliano*, 1 (3): 49-52.
- OCKELMANN K.W., 1983. Descriptions of mytilid species and definition of the Dacrydiinae n. subfam. (Mytilacea-Bivalvia). *Ophelia*; **22**: 81-123.
- OCKELMANN K.W. & WARÉN A. 1998. Taxonomy of and biological notes on the bivalve genus *Microgloma*, with comments on protobranch nomenclature. *Ophelia*; **48**: 1-24.
- PALAZZI S. & VILLARI S., 2001. Molluschi e brachiopodi delle grotte sottomarine del taorminese. *La Conchiglia*; suppl. **297**: 1-56.
- SALAS C., 1996. Marine Bivalves from off the Southern Iberian Peninsula collected by the Balgim and Fauna 1 expeditions. *Haliotis*; **25**: 33-100.
- SALAS C. & GOFAS S., 1997. Brooding and non-brooding *Dacrydium* (Bivalvia: Mytilidae): a review of the Atlantic species. *Journal of Molluscan Studies*; **63**: 261-283.
- SEGUNZA G., 1877. Nuculidi terziarie rinvenute nelle province meridionali d'Italia. *Memorie della Reale Accademia dei Lincei, Classe di Scienze Fisiche, Matematiche e Naturali*, s. 3; **1**: 1163-1200.
- SEGUNZA G., 1879. Le formazioni terziarie della Provincia di Reggio (Calabria). *Memorie della Reale Accademia dei Lincei, Classe di Scienze Fisiche, Matematiche e Naturali*, s. 3; **6**: 1-446.
- WARÉN A., 1989. Taxonomic comments on some protobranch bivalves from the Northeastern Atlantic. *Sarsia*; **74**: 223-259.

The identity of *Nucula permixta* Monterosato, 1875 and *Yoldia striolata* Brugnone, 1876 (Bivalvia: Protobranchia)